Chapter Five

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion:

Historically, changes in normal thyroid uptake values for iodine have been reported in different geographical areas. These changes have been linked to geographical and chronological fluctuations in dietary iodine intake in different populations. Sudan is a country with mixed ethnicity, with access to dietary iodine in table salt. Despite historical reports on deviating normal thyroid uptake values . Acknowledging this rapidly changing emphasis from in vivo to in vitro tests for routine assessment of total thyroid function, it is salutary to remember that in vivo tests are technically simple, inexpensive, and require only modest equipment. Providing unique data on selected aspects of thyroidal iodine metabolism, in vivo studies are essential for diagnosis of many congenital and acquired thyroid disorders and for following the response of thyrotoxicosis to antithyroid drug therapy. Finally, by defining thyroid morphology and regional function, imaging techniques assist the early diagnosis of thyroid cancer. In this account of in vivo thyroid function tests, the authors have focused attention on those procedures which are likely to retain their value in this 'age of radioimmunoassay'.

The aims of this studywere to evaluate normal range of thyroid uptake and thyroid volume & their relationship with age, high & the thyroid function test (TFT). The study consisted of 400 normal individuals – 84.5% women and 15.5% men, with ages ranging from 18 to 67 years (mean of 34.49years). The laboratory assessment of thyroid function was obtained via serum measurements of T3 pmol/L, T4 pmol/L and TSH miU/,Thyroid scintigraphy and uptake were performed using scintillationcamera. study protocol was approved by the Ethics Committee of the Sudan University of science and technology,College of medical radiological science .The interview questionnaire used in the study had two sections namely medical history.Analysis of the medical history noted that participants had not had any thyroid disorders in the past or suspected of having any clinical evidence of current thyroid disorders.

Four hundred participants were considered for the present study and in the light of results from the serum thyroid hormone values and clinical examination 400 participants (338 females and 62 males) were selected (Figure& Table 4.1), most of participants female due to hormones disturbance in female rather than male (John Peter, 2011). Also this result is in agreement with study done by (Crespo, 1996).

The peak incidence was among the age between 18-47 years of age presenting the percent of (84.3%), (Figure & Table 4.2), due to thyroid hormone problem in the young patient and binding that with the activities which done in this level of age (Kamal, 2011)

The results showed that Means of Patients Age , weight (kg),Height (cm),Uptake %,Volume (Cm3),T3 pmol/L,T4 pmol/L,TSH miU/L were 34.49, 66.16, 167.69,3.143,22.901,4.5195,16.6313 and 3.1828 respectively. The normal range for thyroid uptake in this study was ranged from 4.0 to 5.0 % at 20 min after injected with a dose of 3mCi 99mTc. Table 4.3

Figure 4.3 and Figure 4.4 show the distribution frequency of weight and height of patients.

The serum thyroid hormone values had to be determined for each participant. The results of the serum thyroid hormone values are summarized in Table 4.3, andFigures 4.5, 4.6, 4.7 show the distribution frequency of thyroid serum hormone levels (T3, T4 and TSH) of patients All the thyroid hormone values were within the normal range of the laboratory used in this study. Generally thyroid serum hormone values are used to evaluate thyroid function and to diagnose and aid in determining the cause of a thyroid disease. In this study the biochemical tests (TSH, T3 and T4) were used to determine the research participant'seuthyroid state.

Figure 4.5 shows the distribution frequency of T3 hormone of patients in this study the minimum T3value is 3.10 pmol/L, the maximum T3 value is 6.80 pmol/L, the mean value is 4.5pmol/L & the stander deviations is 0.9811, all of these result is within the normal range of T3 (Cameron, 1992).

Figure 4.6 shows the distribution frequency of T4 hormone of patients in this study the minimum T4value is 10.40 pmol/L, the maximum T4 value is 24.50 pmol/L, the mean value is 16.63 pmol/L & the stander deviations is 3.9, all of these result is within the normal range of T4 (Cameron, 1992).

Figure 4.7 shows the distribution frequency of TSH hormone of patients in this study the minimum TSH value is 0.0 miU/L, the maximum TSH value is 5.50 miU/L, the mean value is 3.18 miU/L & the stander deviations is 1.46, all of these result is within the normal range of TSH (Kamal, 2011).

Figure 4.8 shows the distribution frequency of thyroid volume of patients in this study the minimum volume of thyroid is 11.6 Cm3, the maximum volume is 36.7 Cm3, the mean value is 22.9 & the stander deviation is 6.41 which is agree with (Kamal, 2011).

Knowledge of thyroid gland volume plays a key role in the treatment of thyroid diseases by radioactive iodine 131I. Radioiodine therapy is a routine procedure of treatment hyperthyroidism.

Today modern diagnostic has a number of medical diagnostics instruments which are used to estimate of thyroid volume. Undoubtedly these methods we can include a ultrasonography (US) and planar scintigraphy (PS) which are characterized by noninvasive.

Radioisotope methods obtains information not only thyroid size but also on it's a morphology and function.

There is no significant correlation at p = 0.05 between the Thyroid volume versus T3(P = 0.741) ,T4(P = 0.276) and TSH concentration (P = 0.224); however, all were still in the normal range. There was no significant correlation between thyroid volume and body weight (P = 0.873), , body Height (P = 0.063) and. There was a positive correlation between TSH concentration and body weight (P = 0.044) Table 4.4

The characteristics and % uptake results of the 400 euthyroid participants of this study aresummarized in Table 4.3. The normal range for thyroid uptake in this study was ranged from 0.4 -5.0% at 20 min after injected with a dose of 4 mCi 99mTc.

As well as the results showed that there is no significant correlation at p = 0.05 between the thyroid uptake versus T3 (P = 0. 294) but there is significant correlation with T4 (P = 0. 052), howeverthere is no obvious linear association between TSH and uptake(P = 0. 599).

Figure 4.13 shows the relationship between the thyroid uptake and thyroid volume. The study reveals that the thyroid uptake is increases with the increasing of thyroid volume(P = 0. 040), because the enlargement of thyroid volume which is means a lot off trapping of iodination in human body this result is agree with the study of (Crespo, 1996).

The correlation can be fitted in the following equation: y=2.98+7.08E-3*x where x refers to thyroid volume in Cm3 & y refers to uptake in percent.

Figure 4.14 shows the relation between thyroid uptake and age of the patients., The study reveals that the thyroid uptake is increases with the increasing of patients age the correlation could be

fitted in the following equation: y = 3.12x + 6.16E-4*x here x refers to patient age in years and y refers to up take in percent (Crespo, 1996).

Figure 4.15 shows the relationship between the thyroid uptake and weight of the patients. The data showed that: the uptake of thyroid decrease by increasing patient weight in inverse relation and correlation could be fitted in the following equation: y = 2.18 + 0.01*x here x refers to patient weight in Kg and y refers to uptake in percent. Such result is due to volume increases which in turn consume up with distribution the radioactive material as has been explain by (Cameron, 1992).

the results of the Technetium-99m pertechnetate uptake in this study compared with the results reported from literature who similarly evaluated normal values using Technetium-99m pertechnetate.

5.2 Conclusion:

The thyroid gland affected by the presence or absent of iodine, according to the amount of iodine in the body the gland cells can be depresses or enlargement. This situation of gland cells can be investigated with thyroid uptake test which measure the amount of iodine trapped by thyroid cells. This study includes 400 patients the (338female and 62 male) with homogenous distribution of the radiotracer in the result of uptake and normal thyroid function test (T.F.T), in the age between 18 to 67 years and dose of 4 mCi were investigated via thyroid uptake by using gamma camera SPECT system with Tc^{99m}pertechnetate.

The result of this study showed that the uptake of thyroid gland for patient with normal thyroid function test (T.F.T) and homogeneous distribution of the radiotracer is in the range of 0.4% to 5.0%.

By measuring the thyroid volume in this study for patients that with homogenous distribution of the radiotracer & normal thyroid function test (T.F.T) (mean of normal range of these patients T3: 3.1-6.8 p, mole/L, T4: 10-24.5 p mole/L & TSH: 0.2-5.5 miU/L), range of thyroid volume (11.6 Cm3 – 36.7 Cm3) & the correlation between thyroid uptake & thyroid volume can be fitted with the equation: (y=2.98+7.08E-3*x)in Radiation and Isotope Center Khartoum (RICK) and Elnilien Medical Center is.

5.3 Recommendation:

- Further study should do with very larger sample to explain the normal range of thyroid uptake as well as to this result in thyroid with homogenous distribution of radiotracer (without nodules).
- The dose of ^{99m}Tc must be accurately adjusted using Q.C passed dose calibrator with constant factor for radioactive decay.
- The dose also can be exceeded up to 4.0 mCi to evaluate the uptake.
- The distance between the patient head and gamma camera detector must be constant.
- The time between patient injection and imaging must be constant at 20mm for all subjects that may include in other studies.
- Measurement of thyroid area should consider the Iodine deficiently.
- Large thyroid further study with large size, simple size & duration should be done to assess thyroid volume & area for Sudanese female.